


M E M O R A N D U M

TO: Docket Control

FROM: Elijah O. Abinah 
Director
Utilities Division

DATE: June 9, 2022

RE: IN THE MATTER OF ESTABLISHING A COMMISSION POLICY FOR THE
DEVELOPMENT AND INTEGRATION OF COMPETITIVE COMMUNITY
SOLAR AND COMMUNITY ENERGY STORAGE PROJECTS IN ARIZONA.
(DOCKET NO. E-00000A-22-0103)

SUBJECT: JUNE 9, 2022, COMMUNITY SOLAR WORKSHOP PRESENTATIONS

Please find attached copies of the presentations for the Commission's June 9, 2022, Community Solar Workshop Special Open Meeting.

EOA:RSP:yw/

Originator: Ranelle S. Paladino

Attachments

ARIZONA PUBLIC SERVICE COMPANY
(APS)

COMMUNITY SOLAR WORKING GROUP
PRESENTATION

Community Solar Working Group

APS

June 9, 2022



APS Guiding Principles



The APS Promise

Our Purpose

As Arizona stewards, we do what is right for the people and prosperity of our state.

Our Vision

Create a sustainable energy future for Arizona.

Our Mission

Serve our customers with clean, reliable and affordable energy.

APS Guiding Principles for Community Solar

1 | Put the customer first

Design a program around the wants and needs of our customers

2 | Create a sustainable energy future for Arizona

New programs should aid in the progress towards a carbon-free future by 2050

3 | Clean, reliable, and affordable energy

As new programs are considered, reliability and customer affordability, including non-participating customers, are paramount

Suggested Path Forward

- Continue transparent and collaborative working group
 - Additional entities interested in participating can email Stakeholdermeetings@aps.com
- Meet every other week on Thursday afternoons to focus on detailed program elements
 - Draw on learnings from existing stakeholder collaboratives
 - Agendas and meeting topics to be shared in advance
 - Consistent day & time
 - Presentations and meeting summaries will be docketed
- Upon conclusion of this process, APS will submit a community solar proposal for Staff's review consistent with Decision No. 78583

E3

ENERGY+ENVIRONMENTAL ECONOMICS

COMMUNITY SOLAR WORKING GROUP
PRESENTATION

Community Solar Overview

Prepared for APS

June 9, 2022



Energy+Environmental Economics

Lakshmi Alagappan, Partner
Ben Carron, Senior Managing Consultant



E3: Trusted Thought Leaders Providing Data-Driven Analysis

90+ full-time consultants

30 years of industry experience

Expertise in engineering, economics, mathematics, public policy



San Francisco



New York



Boston



Calgary

E3 Clients

300+
projects
per year
across a
diverse
client base



Relevant Examples of Recent E3 Projects

Community solar policy and program design
support for NYSERDA NY-Sun program

Supporting investment in over 5+ GW of
community solar and distributed energy resource
projects

Acquisition support for investment in multiple
demand response companies (~\$100M)

Buy-side diligence support to acquire a
residential solar portfolio (~1 GW | 150,000
customers)

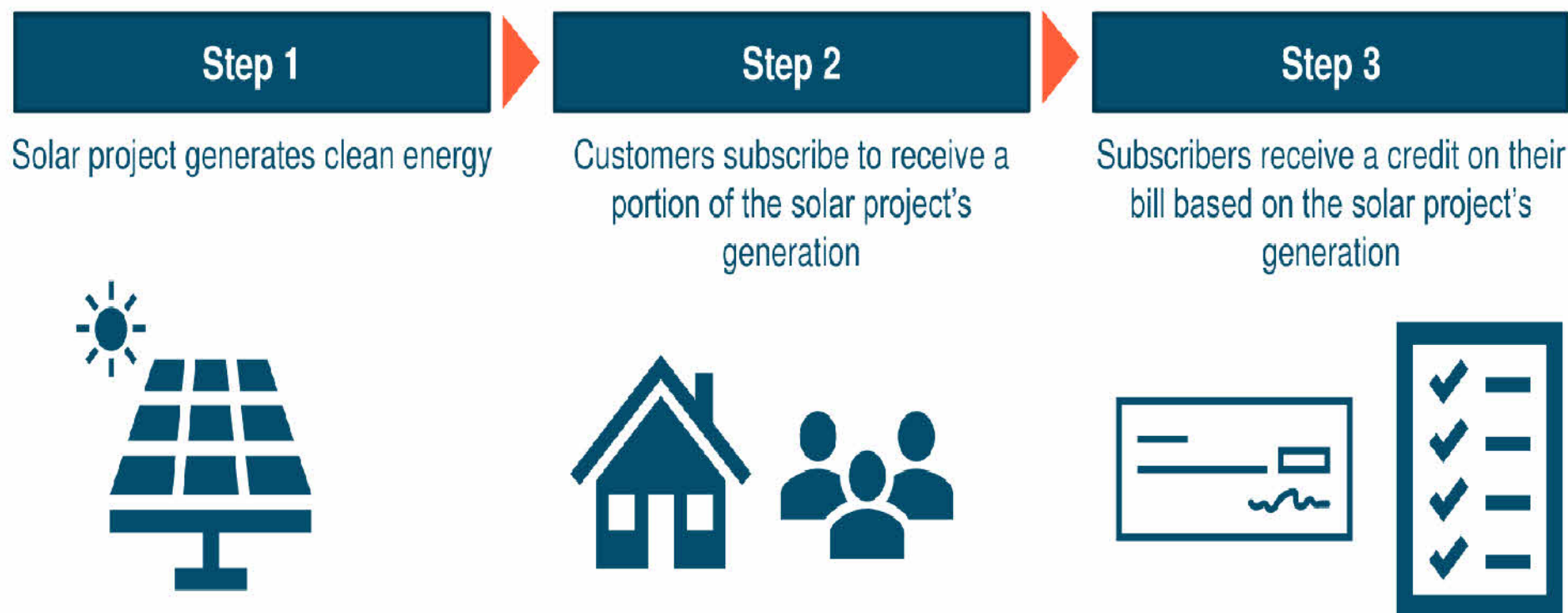
Supporting investment in several **stand-alone storage** platforms and individual
assets across North America (10+ GW |
~\$1B)



What is Community Solar?

“... a solar installation with multiple offtakers or owners, referred to as “subscribers.” The subscribers enter into a contractual relationship with the owner or operator of the installation (or an intermediary) to receive some or all of the financial returns from a predefined share of the installation’s output.”

-National Renewable Energy Laboratory

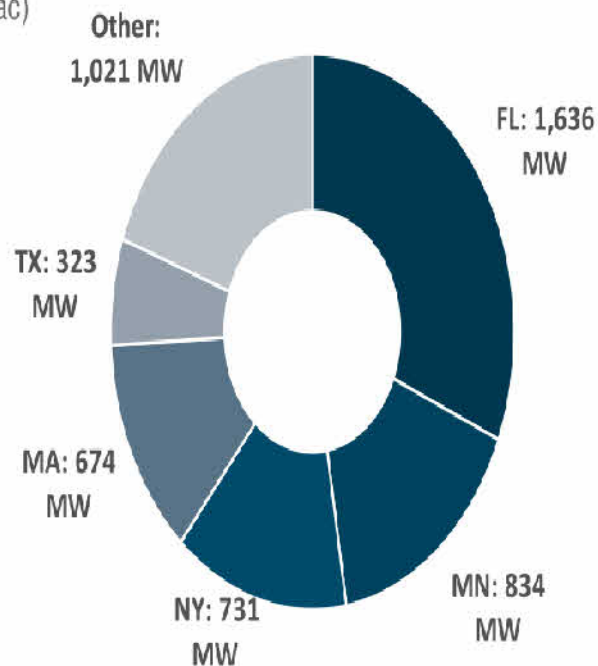




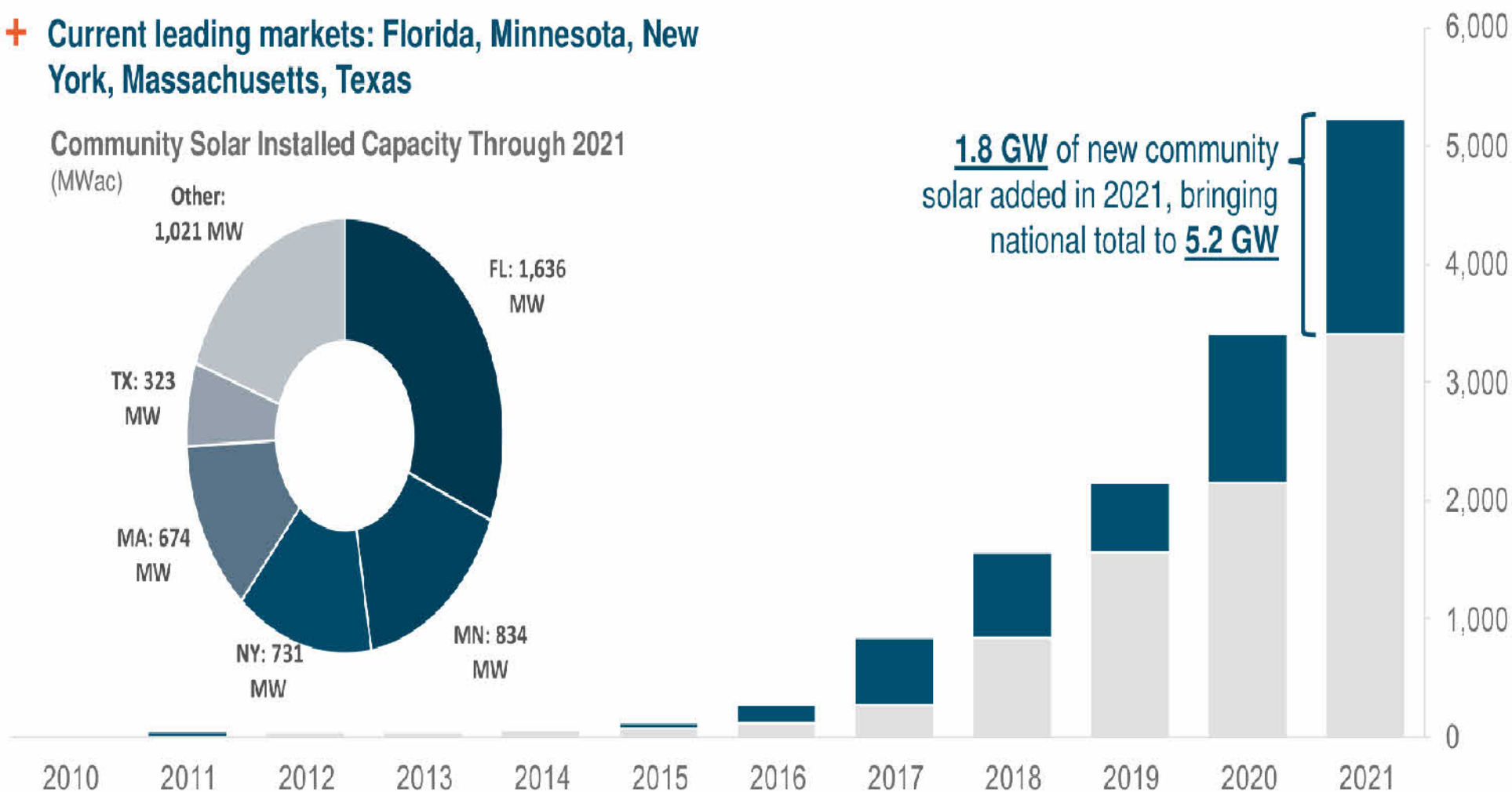
State of the market for community solar in the U.S.

- + As of 2021, US community solar market exceeds 5 GW and is expected to grow to 30-57 GW by 2030
- + Current leading markets: Florida, Minnesota, New York, Massachusetts, Texas

Community Solar Installed Capacity Through 2021 (MWac)



US Cumulative Community Solar Installed Capacity (MW-ac)



Sources: Chan, Gabriel; Heeter, Jenny; Xu, Kaifeng (2022): Sharing the Sun: Community Solar Project Data (December 2021). National Renewable Energy Laboratory., Heeter, Jenny (2021): Community Solar Markets, Trends, & Regulatory Considerations (March 10, 2021). National Renewable Energy Laboratory., The Community Solar Deep Dive: Policy, economics, financing trends and more (April 27, 2021). BofA Global Research.



Five key elements of a community solar program



Design choices vary by state but follow common archetypes





Common Community Solar Ownership Models

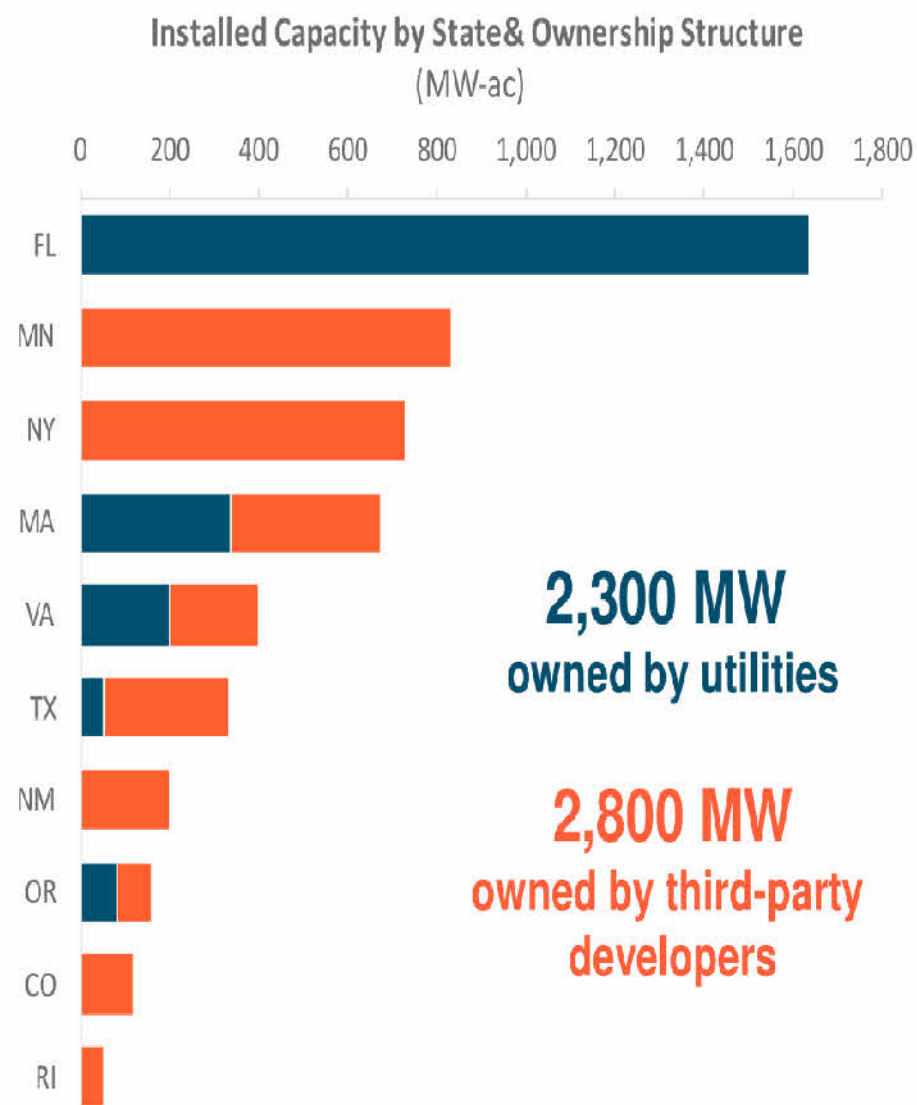
+ Two prevailing models for ownership of community solar facilities:

- **Third-party ownership:** a third-party (developer, retail electric provider) builds, owns, and operates the array and enrolls / manages customers
- **Utility ownership:** utility owns solar array and sells portions of the project to customers, who receive monthly bill credits

+ Utilities often purchase projects that have been developed by 3rd parties via build-own-transfer agreements

- In some cases, utilities market to customers while 3rd parties retain ownership

+ Preferred ownership structures vary state to state; in some cases, states have used hybrid models for ownership





Community Solar Compensation

+ Asset owner is typically responsible for enrollment and contracting with customers

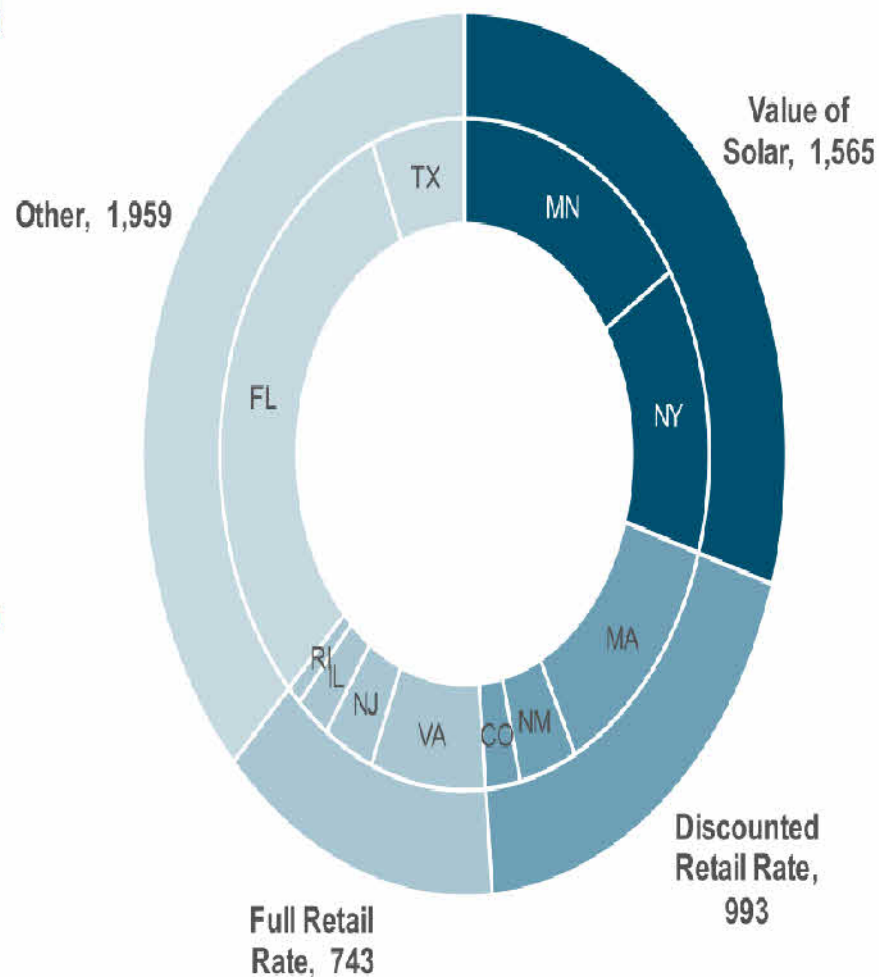
- Customers pay either subscription or energy charges and receive credits towards their electricity bills
- Different mechanisms are used for customer bill offsets

+ Credit value calculations vary by state:

- **Value of solar:** credits based on administratively determined “value of solar” calculations
- **Full retail rate:** customers’ bill credits offset kWh consumed on a 1:1 basis
- **Discounted retail rate:** customers’ bill credits offset kWh consumed on a discounted basis
- **Other:** negotiated and/or competitively determined rate
- Additional incentive value “adders” possible

+ REC ownership varies based on program design

Community Solar Capacity by Compensation Mechanism (MW-ac)





Other elements of community solar program design

Program Enrollments

Programs typically require a share to be contracted with residential/low-moderate income (LMI) customers

Programs may have limits on shares allocated to individual C&I customers

Developers often use subscription management companies to market and manage customer operations

Program Size

Program sizes range from 50 MW to GW+ in more mature markets

Programs often begin around 100-200 MW but very much depends on potential size of market

Voluntary markets (those without policy directives) do not have program limitations

Project Eligibility

Project size in programs across the US are typically 5 MW or less

Some states have min project sizes that are 1-2 MW

Voluntary markets do not have size limitations



Review of select US community solar programs

State	Program Size (MWac)	Ownership		Customer Compensation Structure				Max Project Size	
		Utility	Third Party	Full Retail Rate	Discounted Retail Rate	Value of Solar	Other	1-5 MW	>5 MW
Colorado	175		✓		✓			✓	
Florida	n/a	✓					✓		✓
Illinois	1,000		✓	✓				✓	
Massachusetts	650	✓	✓		✓			✓	
Minnesota	500		✓			✓		✓	
New Jersey	175		✓	✓				✓	
New Mexico	200		✓		✓			✓	
New York	1,500		✓			✓		✓	
Oregon	160	✓	✓					✓	
Rhode Island	50		✓	✓				✓	
Texas	n/a	✓	✓				✓		✓
Virginia	400	✓	✓	✓				✓	

Newer programs start ~200 MW

Capacity under utility & third-party ownership roughly split

Customer compensation models vary widely across states

Most programs target small-scale installations



Key Questions to Answer

+ What is the overall role and purpose of a community solar program?

- Achieving clean energy targets?
- Providing customers access to solar?
- Supporting underserved and LMI customers?
- Supporting local/community economic development?

+ What is the right role for the utility and 3rd party developers?

+ What is the compensation mechanism?

+ What is a reasonable size for a program?

+ What type of projects (size / configuration) should be prioritized?



Energy+Environmental Economics

Thank You

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Ben Carron ben.carron@ethree.com

NATIONAL COMMUNITY SOLAR PARTNERSHIP
(NCSP)

COMMUNITY SOLAR WORKING GROUP
PRESENTATION



U.S. DEPARTMENT OF
ENERGY

NREL
Transforming ENERGY

 **BERKELEY LAB**



National Community Solar Partnership

Joyce McLaren

June 9, 2022

Arizona Corporation Commission - Community Solar Working Group

NCSP is a coalition of community solar stakeholders working to expand access to affordable community solar to every American household by 2025.



Image via DOE and NCSP

A U.S. Department of Energy (DOE) partnership, led by the Solar Energy Technologies Office and supported by the Weatherization and Intergovernmental Programs Office.

NCSP Definition of Community Solar

- Community solar allows multiple customers, or “subscribers”, to purchase the output from a single solar photovoltaic array.
- The subscribers enter into a contractual relationship with the owner or operator of the installation (or an intermediary) to receive some or all of the financial returns from a predefined share of the installation’s output.
- Community solar gives customers who can not install solar on their own property a way to access the benefits of solar energy.

Community Solar Distributes Benefits to Subscribers that Choose to Participate

Exclusive

All community solar programs serve an exclusive set of subscribers within a utility or community choice aggregation service territory.

Opt-in

Participation in community solar is always by choice. Subscribers opt into the program, either through contractual payments or some non-financial transaction.

Financial Benefits

All community solar products convey some part of the financial benefit to subscribers.

Other Benefits

Community solar products may also include non-financial benefits, such as environmental benefits, increased energy resilience, ownership or wealth building opportunities and workforce development.

Key Actors in Community Solar Programs

There are many actors in a community solar project. In some cases, the same organization may fill multiple roles.

- The **host** is the owner of the location where the community solar project will be built.
- The **developer** constructs the community solar project.
- The **sponsor** manages the subscriptions to the solar project and the relationship with the utility. The project sponsor and project host can be the same.
- The **utility** measures the energy produced by the solar project and distributes the power via the electricity grid.
- The **subscribers** are the individuals, businesses, nonprofits, or local governments, that purchase a share of the electricity generated by the community solar project or otherwise benefit from the project.

Community Solar Ownership Arrangements

Utility-Owned

The utility company provides investment capital to build the project, in accordance with utility regulations or board oversight. The utility may be the host or have an agreement with another party that hosts the solar panels on their site.

Third Party-Owned

A third-party investor provides investment capital and owns all components of the solar project, under an agreement with the site host. The investor receives a rate of return to cover their upfront investment along with financial incentives and subscription payments

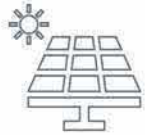
Third Party Flip

A third-party investor provides investment capital and owns the solar assets long enough to take advantage of federal tax credits and project revenues to gain a rate of return. After 6-10 years, the ownership then transfers (i.e., “flips”) to a community partner.

Community-Owned

The solar project and solar assets are wholly financed and owned by local individuals and entities. Local owners may or may not be able to access federal tax benefits. Community-owned projects may accept lower rates of return, making projects more financially viable.

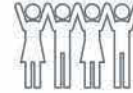
Community Solar Project Benefits



The project host and/or sponsor receives financial benefits from federal, state, and local renewable energy incentive programs



The community solar project provides the **utility** with inexpensive, reliable power



Subscribers access the financial benefits of solar



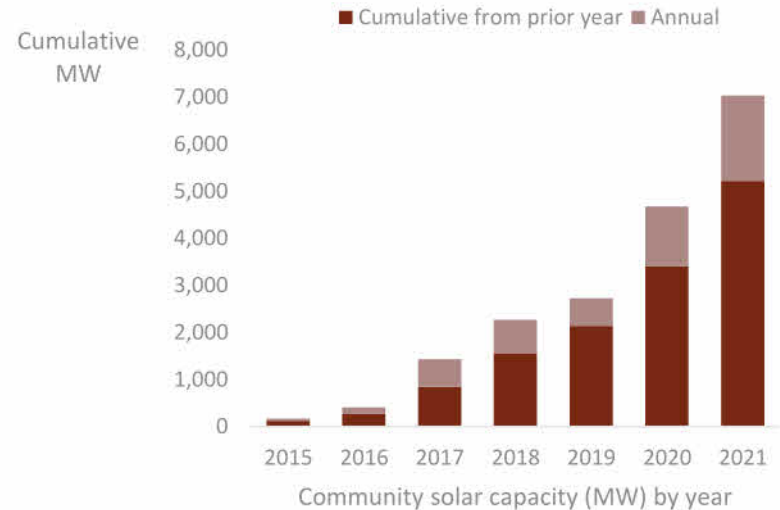
Everyone benefits from cleaner air and a more diverse energy supply and growing clean energy workforce.

Subscribers in some markets receive a monthly savings of 5-15% on their electricity bill.¹ The NCSP goal is for customers to receive a 20% savings by participating in community solar.

¹<https://solstice.us/solstice-blog/what-is-community-solar/>

Community Solar is Growing Rapidly

- Community solar is one of the fastest growing segments of the U.S. solar photovoltaic market.
- The amount of community solar (measured in megawatts) more than doubled, on average, each year between 2010 and 2021.
- About 1800 MW came online in 2021 alone.



[Sharing the Sun Community Solar Project Data \(December 2021\)](#)

NCSP Goals

- Make community solar **accessible** to every U.S. household
- Ensure community solar is **affordable** for every U.S. household
- Enable communities to realize additional **meaningful benefits** and value streams from community solar installations.



Represents an increase
from **3 GW to 20 GW** of
community solar capacity



\$1 billion in savings
reflects an average
bill reduction of 20%

National Community Solar Partnership (NCSP)

Pathway to Success

TECHNICAL
EXPERTISE
AND CAPACITY
BUILDING



STATE
ENGAGEMENT



ACCESS
TO CAPITAL



CUSTOMER
ENGAGEMENT



HEARTS
AND MINDS



**NCSP
TARGET**

5 million households
and \$1 billion
in savings

Resulting in...

- ★ An average 20% energy bill reduction
- ★ 700% increase in community solar capacity
- ★ Meaningful benefits such as resilience, career opportunities, and community wealth building

COMMUNITY-BASED ORGANIZATIONS | STATE AND LOCAL GOVERNMENT | DEVELOPERS | LENDERS | PHILANTHROPISTS | UTILITIES | CUSTOMERS

Community Solar Program & Project Tracking



States with supportive community solar legislation
(NREL, updated from Heeter, Xu, and Chan (2021))



The **Sharing the Sun Database** is a national list of community solar projects.

By the end of 2020, we estimate that there were at least 3,253 MW-ac of community solar capacity across ~1,600 projects in 39 states + D.C.

<https://data.nrel.gov/submissions/167>

Sharing the Sun: Community Solar Deployment, Subscription Savings, and Energy Burden Reduction presents U.S. community solar market trends through 2020, with content on energy burden reduction potential.

NCSP Free Technical Assistance

- ✓ Receive 1:1 assistance from subject-matter experts
- ✓ Simple application
- ✓ Open to all NCSP Partners on a rolling basis

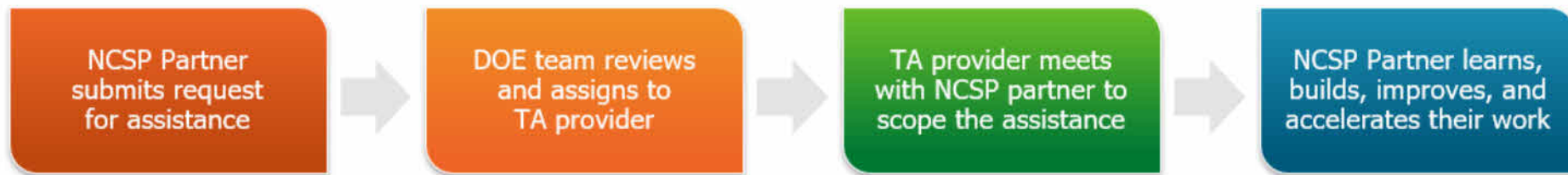


Image via NCSP

Register to be an NCSP Partner on the NCSP Mobilize website:
<https://ncsp.solarinyourcommunity.org/registrations/groups/39758>

NCSP Collaboratives

- ✓ **States Collaborative** – *share successes, challenges, & resources regarding regulatory and policy environments that support community solar at the state level*
- ✓ **Municipal Utility Collaborative** – *provide information and capacity building around community solar to municipal utilities*
- ✓ **Multifamily Affordable Housing Collaborative** – *identify and scale successful approaches and generate innovative community solar business models*

NCSP's Credit Ready Solar Initiative

- ✓ connects project owners, developers, lenders, and philanthropy organizations
- ✓ leverages working groups, technical assistance, training, and strategic partnerships
- ✓ builds a pipeline of credit-ready community solar projects and create access to a community solar marketplace
- ✓ supports more equitable deployment of community solar by addressing barriers to project funding

<https://www.energy.gov/communitysolar/credit-ready-solar-initiative>



COMMUNITY SHARED SOLAR

POLICY AND REGULATORY CONSIDERATIONS

ABSTRACT

Shared solar, also called community solar, is an increasingly popular business model for deploying distributed solar technology. Shared solar projects allow customers that do not have sufficient solar resource, that rent their homes, or that are otherwise unable or unwilling to install solar on their residences, to buy or lease a portion of a shared solar system. The participant's share of the electricity generated is credited to their electricity bill, as if the solar system were located at their home.

The shared solar model expands the availability of



Photo by Western Area Power Administration, NREL 08822

solar projects. Aggregated or group purchasing refers to multiple stakeholders coming together to purchase

Community Shared Solar: Policy and Regulation Considerations

explores the ways in which the shared solar business model interacts with existing policy and regulations, including net metering, tax credits, and securities regulation. It presents some of the barriers that shared solar projects may face and provides options for creating a supportive policy environment.

<https://www.nrel.gov/docs/fy14osti/62367.pdf>



Photo by Dennis Schroeder, NREL 60074

Equitable Access to Community Solar: Program Design and Subscription Considerations

Equitable Access to Community Solar

provides a summary of existing state-level programs that are targeted to serve historically excluded households , as well as estimated their capacity and subscribers in the United States. In addition, we highlight strategies to reach potential customers.

<https://www.nrel.gov/docs/fy21osti/79548.pdf>



Thank you!

Joyce.McLaren@NREL.gov

COALITION FOR COMMUNITY SOLAR ACCESS
(CCSA)

COMMUNITY SOLAR WORKING GROUP
PRESENTATION



COALITION FOR
COMMUNITY
**SOLAR
ACCESS**

Community Solar 101

Kevin Cray - June 2022

Types of solar

ROOFTOP SOLAR

Installed on the roofs of homes and businesses, rooftop solar offers people control over where their electricity is produced and lowers their monthly utility bill.



COMMUNITY SOLAR

The fastest-growing segment within the solar industry, community solar refers to local solar facilities shared by multiple subscribers who receive credits on their electricity bills for their share of the power produced.



UTILITY SCALE SOLAR

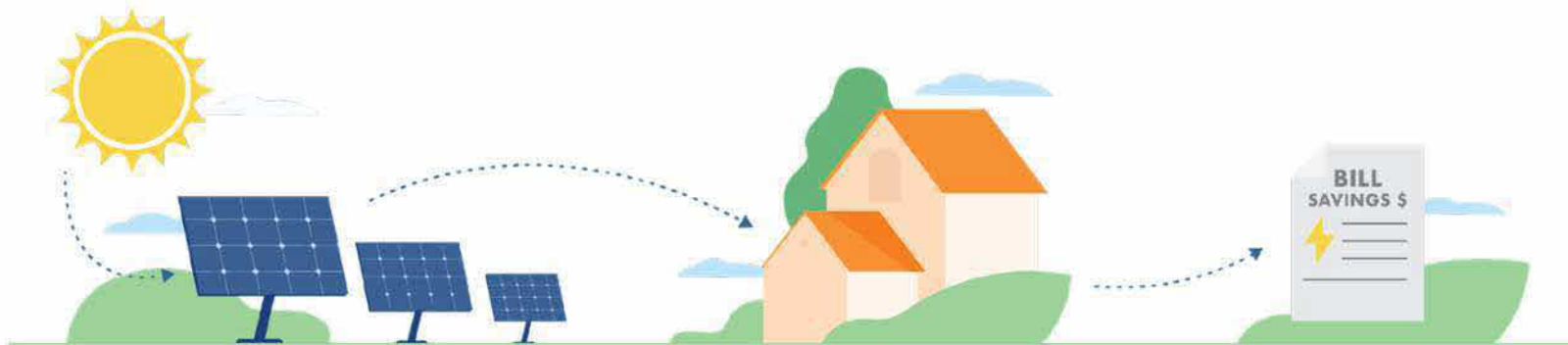
The largest scale of solar installation typically sized over 25 megawatts (MW) often situated on large swaths of land (50+ acres)



What is community solar?



- Projects have historically 2-5 MW however some markets are now enabling larger projects up to 10 MW but still connected to the distribution system
- Locally sited projects in and around your community
- Multiple subscribers receive monetary benefits from energy produced by a single solar array
 - small businesses, churches, schools, IQ communities, renters, other households
- Participants receive a credit on their electric utility bill for portion of power produced



How does it work?



What do they look like?

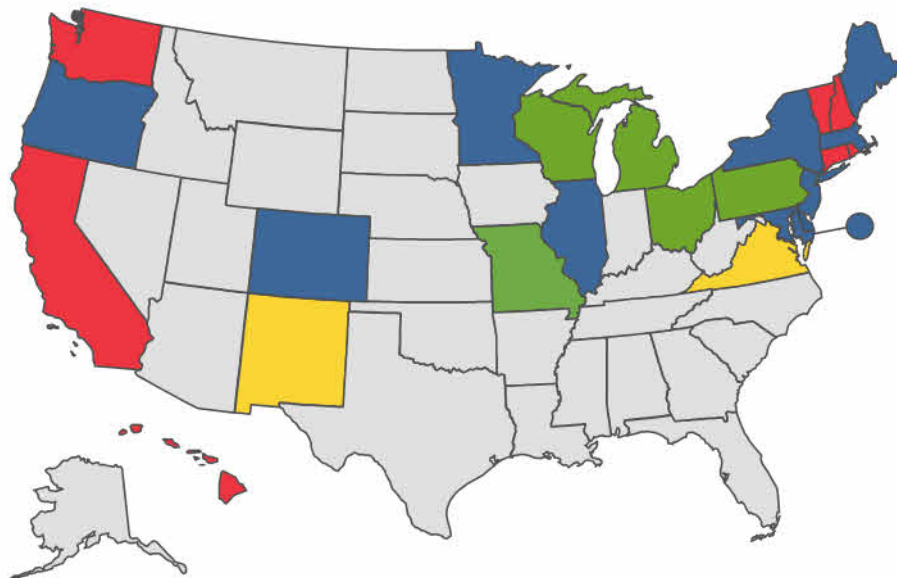


Source: Borrego Solar, Clinton, IL



Source: Summit Ridge Energy, Carol County, MD

Third-party community solar policy in 22 states



Established
program



Rules in place but
limited market



Legislation proposed
or pending



Legislation in place,
regulations pending

Total installed capacity, 2021:

3.5+ Gigawatts

~1,500 Projects

Total potential capacity, 2030:

50+ Gigawatts

15,000+ Projects

Total customers served:

2021: ~100 -200,000

2030: 5 million+

*Source: CCSA and NREL datasets; Vibrant Clean Energy
"Local Solar Roadmap" 2020.*

What are the benefits?



Competition & Innovation

- Allows for innovative business models
- Efficient products, faster deployment, increased savings for customers & more economic benefits
- Don't confuse w/ retail competition (energy from projects is sleeved through utility and all subscribers still get all generation from the utility; comparable to APS' AG-X tariff)

Customer Bill Savings & Flexibility

- All customers can participate regardless of their economic status or housing type however benefits can also be focused on specific customer segments to achieve various policy priorities
- Successful markets attract participants because subscribers save on average 10-15% on their bills
- Higher savings can be targeted toward certain customer classes
- Subscriptions are portable within the utility territory & transferable to another customer if they move
- Customer can sign up for as little as they want but not more than 100-120% of annual usage

What are the benefits?



Grid benefits

- Lowers grid costs for all ratepayers by generating energy closer to customers
- Projects can be strategically located in areas of the grid to maximize these benefits
- Interconnection upgrades paid by private capital result in grid reliability improvements
- Distributed energy improves grid resiliency to weather, climate, terrorist attacks, & other large-scale disruptions

Land and environment

- Offers stable lease revenue for farmers & landowners
- Small scale allows farmers to utilize underperforming portions of their land
- Preserves land for future uses - not a permanent installation
- Creates value on brownfield sites and other areas within a built environment

What are the benefits?

Economy

- Helps diversify rural and urban local economies
- Each project creates 50-100 family sustaining local jobs - that's thousands of jobs created across the totality of the program
- Leads to increased property tax revenue for local jurisdictions
- Lead to tens of millions of dollars in customer bill savings - depending on program size



PennState
College of
Agricultural Sciences

PSU Study: Community solar would support 12k jobs; generate \$1.8B short-term economic impact for Pa.



MICHIGAN STATE
UNIVERSITY

Michigan State University Study: Community Solar Would Create \$1.47 Billion Economic Impact, Support 18,500 Well-Paying Jobs



**THE UNIVERSITY OF
NEW MEXICO**

Community solar could support 3,760 jobs; generate \$517 million short-term economic impact for New Mexico

Policy Considerations



- **Program Structure:**

- What is a community solar facility? How big? Where can it be located?
- What is a subscriber? How many are required for each facility? What types of customers can participate?
- How big is the program? Is there a cap? How is program capacity allocated?
- Who administers the program? Are there any restrictions on who can develop/own projects?

- **Bill credit:**

- The authority to provide bill credit to the customer when the system is not behind the customer's meter.
- Governs how and when the credit is applied to the customer's bill, and for how long.

- **Bill credit value:**

- The actual amount the subscriber receives per kWh on the bill.
- Also covers the value of unsubscribed energy; may include value for the renewable energy credit.
- Most often the bill credit rate is either tied to the subscribers applicable retail rate or more generically applies a standard value of solar rate to all subscribers.

- **Other Issues:**

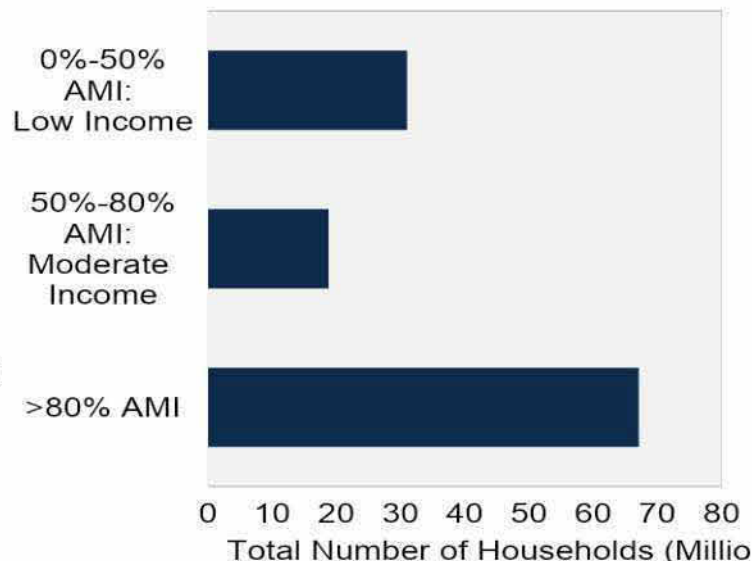
- Interconnection rules (studying projects and managing the queue)
- Participation rules (registration, how to access utility bill credit tariffs, how CS facility interacts with the utility, etc.)
- Customer acquisition and management (LMI participation, requirements for resi or commercial participation, consumer protections)

Low and Moderate Income (LMI) Participation



- Community solar provides the **flexibility to deliver clean energy access to all income-qualified customers, urban and rural.**
- Community solar offers **significant benefits to income qualified customers, including cost savings.**
- Community solar provides a mechanism to **bridge the gap between higher-income communities who have historically had access to rooftop solar and their income-qualified neighbors that have not**

Share of U.S. Households:
Low-to-Moderate Income (LMI) vs. Non-LMI



Some challenges to serving LMI Participation



- Challenges generally result from program design.
 - Burdensome verification process
 - Insufficient or no additional consideration for LMI participants in project valuation (esp. if program requires higher savings for LMI subscriber)
- Housing authorities/programs can have a lower credit rate than residential participants, lowering the overall value for LMI
- LIHEAP and other state energy subsidy programs often do not work with community solar
- Data sharing is challenging
- LMI participants may not have internet or other means to facilitate easy communication with provider; door-to-door sales are often seen as predatory.

A person wearing a bright yellow jumpsuit is holding an orange hard hat. They are standing in front of a large solar farm with rows of solar panels stretching into the distance under a clear sky. The image has a warm, golden-hour lighting. On the left side, there are two large, overlapping geometric shapes: a green one on top and a blue one on the bottom.

Community Solar 101

SOLAR UNITED NEIGHBORS
COMMUNITY SOLAR WORKING GROUP
PRESENTATION



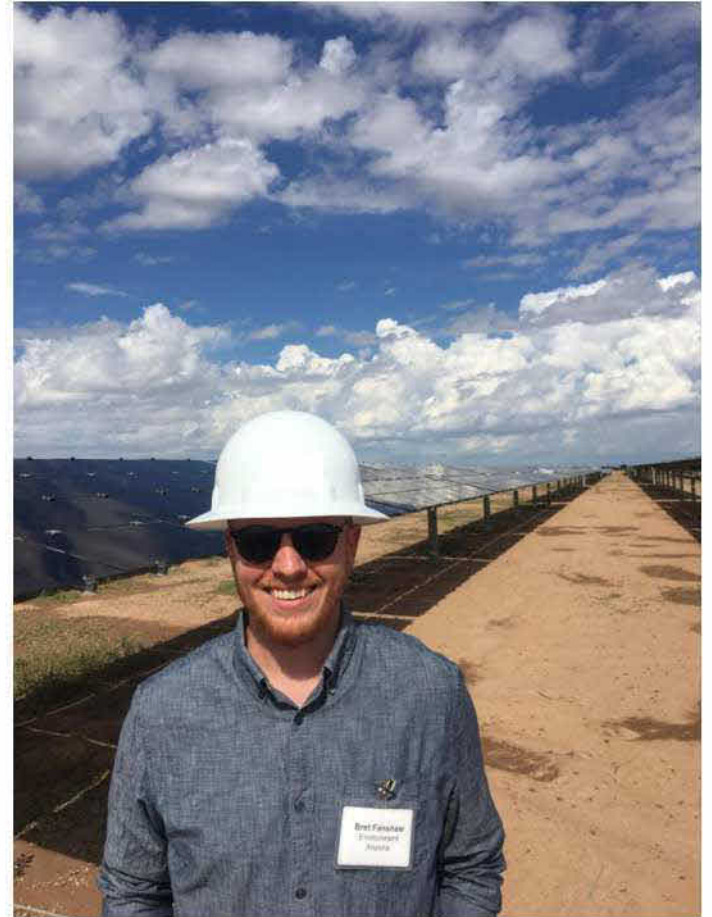
Community Solar

ACC Workshop
June 9, 2022



Bret Fanshaw, Solar United Neighbors

- Arizona Program Director & West Region Director
- Phoenix, AZ
- APS customer
- Excited about community solar!





SUN is a national 501c3 nonprofit organization dedicated to helping people go solar, join together and fight for their energy rights.



What we do

- Rooftop solar buying groups – “solar co-ops”
 - >57 MW installed
 - >\$146M invested
- Consumer education & assistance
- Solar policy & advocacy
- Community solar sign ups

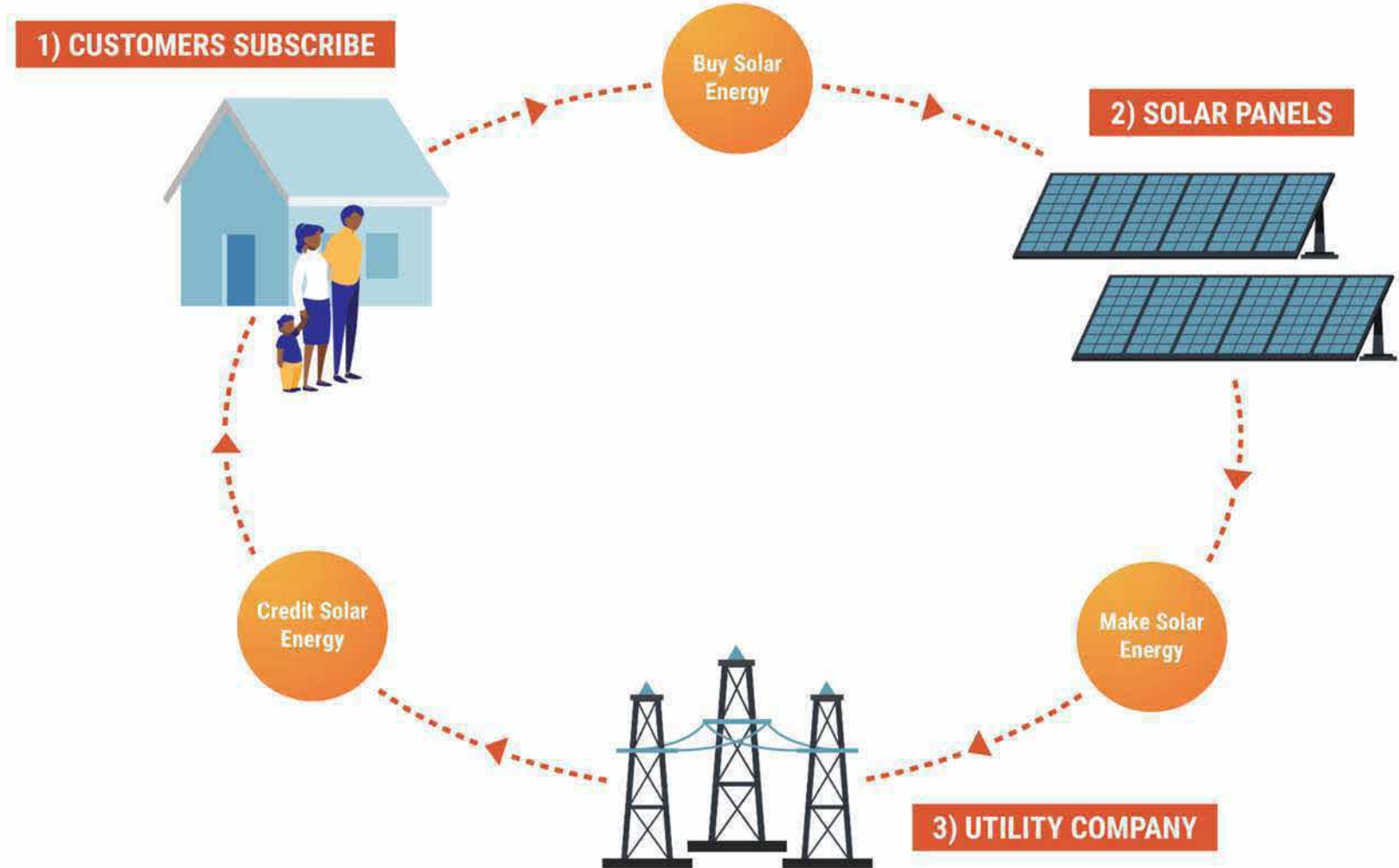


Why community solar?

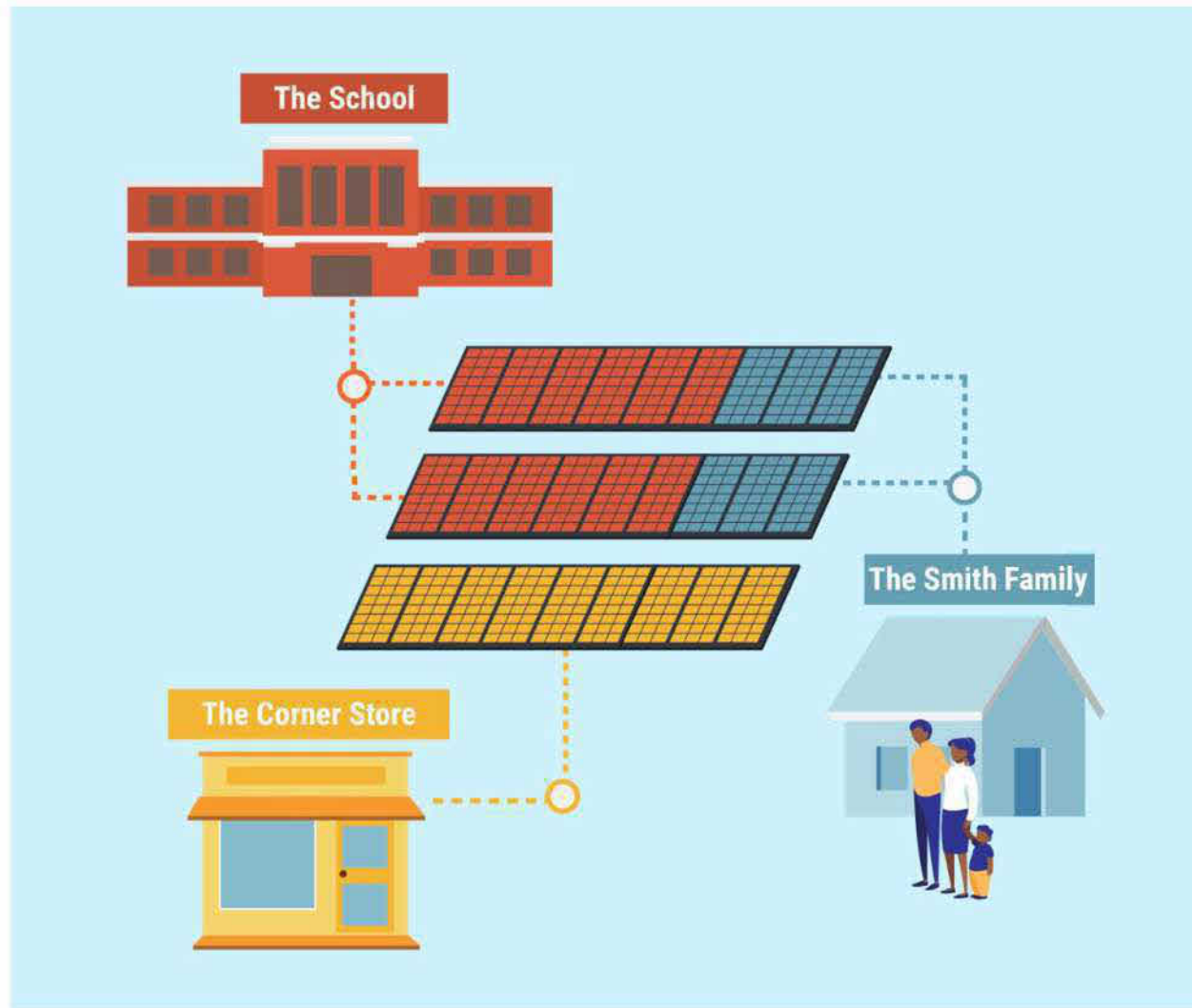
- Provide solar access to thousands of Arizona homes & businesses currently unable to install rooftop solar.
- Common reasons:
 - Live in an apartment or condo
 - Rent/lease their home/office
 - Roof is unsuitable or shaded
 - Not able to afford rooftop solar



How it generally works



Sharing solar



Considerations for community solar program development:

- **Predictable, understandable cost savings.**
 - Participants receive solar credits on their utility bill.
 - Program designed to save consumers money.
- **Opportunities for third-party ownership**, including by individuals & nonprofits.
- **Good return on investment.** If possible, consumers should be able to invest in or own part of a system if they want to.
- **Transparent, customer-friendly process:**
 - Easy to subscribe, unsubscribe, and transfer your share to new residents.
 - Easy to understand what you are paying for. The program should inform subscribers of any ongoing charges for maintenance or other costs.

Considerations for community solar program development:

- **Local benefits:**

- Clear connection to a specific solar project or an identifiable group of projects in nearby locations.
- Projects should be sited responsibly to minimize development impacts and support community goals.
- Promote local job creation and strengthen the electric grid.

- **Expanded solar access:**

- Include a carveout for low-and middle-income (LMI) participation.
- Minimize hurdles for LMI participation.
- Allow residents of multi-unit buildings to subscribe.

- **Competitive market development:**

- Projects should benefit from a fair competitive process to lower prices and encourage innovation.

Thank You!

Bret Fanshaw

Arizona Program Director + West Region Director

Solar United Neighbors

bfanshaw@solarunitedneighbors.org

602.962.0240

More info: <http://cs.solarunitedneighbors.org>